**Ball and Beam Experiment Report**

**Experiment Result**

1. **Calibration**

**(1) Position**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Position | -30 | -10 | 0 | 10 | 30 |
| Voltage |  |  |  |  |  |
| a= b= | | | | | | |

**(2) Angle**

a= b=

**2. Beam Angle Control**

(1) Desired angle is 0. Please Record the Steady-error and the data in different

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 3 | 5 | 7 | 15 | 20 |
| Steady-error |  |  |  |  |  |  |

(2)Data Plot

**3. BALL AND BEAM EXPERIMENT - PART I**

(1) Find the parameter of the control ,with different damping ratio  and natural frequency

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |



(2) Desired position is 0 cm. Set up all the parameter and plot the performance data.

**4. BALL AND BEAM EXPERIMENT - PART II**

(1) Find the parameter of the control ,with different damping ratioand natural frequency , decay rate a

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | a |  |  |  |
| 1 | 3 | 10 |  |  |  |
| 0.707 | 3 | 10 |  |  |  |
| 0.707 | 3 | 20 |  |  |  |
| 0.5 | 3 | 20 |  |  |  |



(2) Desired position is 0 cm. Set up all the parameter and plot the performance data.

**Discussion**

* 1. Why we use a Cam to drive the beam to change angle but not use motor to drive the beam to change the angle ?
  2. Explain when we were at beam angle experiment, why not we can make  only with ?
  3. Explain when we were at beam angle experiment, what reason cause the different phenomena with different ?
  4. Do you think this system is a stable system? What is your reason?